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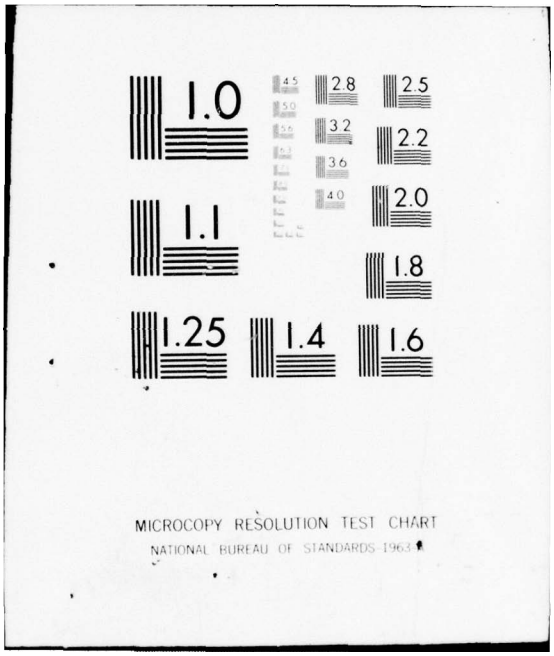
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DEFENSE SYSTEMS MANAGEMENT COLLEGE

PROGRAM MANAGEMENT COURSE
INDIVIDUAL STUDY PROGRAM

A PROPOSED
MINI-MANAGEMENT INFORMATION SYSTEM
FOR THE
PROGRAM MANAGER FOR AVIONICS
NAVAL AIR SYSTEMS COMMAND HEADQUARTERS

STUDY PROJECT REPORT
PMC 77-2

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CAPT USN

FORT BELVOIR, VIRGINIA 22060

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE: A PROPOSED MINI-MANAGEMENT INFORMATION SYSTEM FOR THE PROGRAM MANAGER FOR AVIONICS, NAVAL AIR SYSTEMS COMMAND.

STUDY PROJECT GOALS: To develop a Management Information System for use by the Program Manager for Avionics, which will provide timely, accurate, and complete information which can be of assistance to the PM in managing the several Avionics Projects for which he is responsible, and to assist in the daily administrative functions of the Division. The report identifies potential areas where the MIS could be used. In Addition, the implementation and human factors element is addressed briefly.

STUDY REPORT ABSTRACT: The report describes selected functions within the Avionics Division of the Naval Air Systems Command Headquarters which could be incorporated into a computer base mini-Management Information System (MIS), The data and information upon which to base the report was derived from interviews, books and articles on MIS, and personal experience having been assigned to the Avionics Division.

If a computer were to be made available to the Division to execute the MIS functions, the Division Director/Program Manager for Avionics would be better able to track the cost, schedule, and technical performance of the many assigned projects. Additionally, many administrative functions could more efficiently be performed if incorporated into the computer/MIS. With more complete information available, the Division Director/PM could more efficiently manage the assigned projects.

SUBJECT DESCRIPTORS: Program/Project Management, Planning and Control Systems, Management Information Systems,)10.02.05.02).

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A PROPOSED MINI-MANAGEMENT INFORMATION SYSTEM FOR THE PROGRAM MANAGER FOR AVIONICS, NAVAL AIR SYSTEMS COMMAND HEADQUARTERS

Individual Study Program
Study Project Report
Prepared as a formal report

Defense Systems Management College
Program Management Course
Class 77-2

by

B. F. SHORT
CAPT USN

NOVEMBER, 1977

Study Project Advisor
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EXECUTIVE SUMMARY

This report describes some of the potential benefits which would accrue if a computer based mini-Management Information System (MIS) were installed in the Avionics Division of the Naval Air Systems Command. A brief outline of the Command functions, and a more detailed description of the responsibilities and the current operating procedures within the Avionics Division which could be incorporated into a MIS have been brought forth. Additionally, the Avionics Division Director also serves in the newly created billet of Program Manager for Avionics (PMfA). Many of the missions associated with the PMfA could also be integrated into the MIS, which would provide the Director better visibility into the cost, schedule, and technical performance on the projects assigned to Deputy Program Managers. Other equipments, assigned to Acquisition Managers, could also be incorporated into the system based on risk or cost.

A computer based management information system should be capable of providing upper management with all of the necessary relevant information, when it is desired, and in the format requested, to support management in the decision making process. Although a MIS will require more assets than are currently be expended to carry out the functions which will be placed in the system, the additional capability which

a computer can provide, to better manage all of the projects, will be well worth the effort expended. The payoff will be in the intangibles of better management and more efficient usage of assets in other areas for which the Division and the Program Manager are responsible.

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I. Introduction

A. Purpose. The high cost of "people" in today's business, the technology explosion the world is experiencing, the shrinking defense budget, and the escalating cost of weapons systems dictate that every possible effort be made to increase the efficiency and timeliness of the management process within the Department of Defense, if the United States is to maintain its competitive edge. In an endeavor to increase the efficiency, even if ever so slightly, and to speed the flow of paper through the bureaucratic chain, this study paper will focus on a small, though important, segment of the Naval Air Systems Command Headquarters (NAVAIRSYS-COMHQ) structure, the Avionics Divisions, with a proposal for a computer based Management Information System (MIS). This system would have the capability to expedite the administrative work load, and to provide information currently not available on a real time basis to the Program Manager for Avionics/Division Director, to aid in the decision making process. The system being proposed does not completely follow the functions or purpose of a MIS in the classical sense, but rather, will initially be proposed as a mini-MIS with a "word processing" capability, and have the ability to operate as a small general purpose computer .

This report will provide an overview of the NAVAIRSYSCOMHQ organization, and a somewhat more detailed examination of

the responsibilities of the Avionics Division. Recently, the Division Director was chartered as the Program Manager for Avionics (PMfA). The responsibilities and relationships will also be explained in greater detail. Since the Division Director and the PMfA are one in the same, with many overlapping responsibilities, no rigorous attempt has been made to distinguish between the two titles where this duplicative relationship exists. There are instances where both could be listed, but for simplicity normally only one title has been used. Section II will conclude with a brief discussion on the current operating procedures and methods employed within the Avionics Division. Section III will discuss a computer based MIS, the attributes of a good system, and some security considerations. Section IV will deal with specific functions within the Division and the PMfA which would be amenable to inclusion in the proposed MIS. Section V will briefly deal with the implementation within the division, and the human factors element which must be taken into consideration when first introducing a system such as this into an organization.

B. MIS: Basic Concepts. A management information system (MIS) is an identifiable set of policies, models, procedures and files of information which operate to record, manipulate, store, retrieve, process and display information useful in managing some aspect of an organized enterprise. Such systems may depend only on rather simple mechanical devices

operated directly by humans hands, such as pencils, pens, ledgers, charts, and so on; or they may also depend on more complex devices and machines, such as slide rules, calculators or electronic data processing systems (1:1). The primary goal of any MIS should be to support managerial decision making by supplying relevant information when required (2:4). When computers were first introduced into the managerial world as an adjunct to information systems, they were, by and large, designed by those whose expertise lay in the field of computer operations and programming, not in the areas of management or administration. The initial systems tended to be large, cumbersome, expensive, and more importantly, did not serve the needs of top management very well. Hence, many of these expensive systems did not live up to their expectations and were chalked up as failures, which gave the field of computer based MIS a bad name. During the past five years, however, managers have played a more prominent role in the design and the general architecture of the system destined to serve their organization. As a result, computer based MIS are now taking their place in the management world as an accepted and useful tool for the manager, both in the program office and in the world of the functional baron in the line organization.

C. Scope. A review of the shelves in any library will reveal numerous books and articles dealing with computer based MIS, covering the spectrum from those based on a micro-

computer to the multi-computer system costing tens of millions of dollars. In an endeavor to make this report interesting, meaningful, and hopefully of value to the user, bounds have been established on items for consideration, which emcompass only those which could reasonably be expected to be accomplished with the existing manning and current DOD fiscal dollar constraints. It is expected, that should the proposed system be installed, no additional billets would be authorized, nor could any one be hired to fill existing vacancies to manage and maintain the system. In addition, current government directives are very explicit and restrictive in nature when one is considering acquisition of computer hardware and software, which will also tend to limit the size and the capability of the computer which can be obtained to fill the MIS requirement.

II. Background

A. The Naval Air Systems Command Headquarters Functional Organization: The Naval Air Systems Command Headquarters (NAVAIRSYSCOMHQ) is one of five subordinate commands of the Naval Material Command (NAVMAT) and is located in Washington D.C.. NAVAIRSYSCOMHQ is organized into eight functional groups and one Project Management Office (AIR) (PMOA), as shown in Figure 1, the latter responsibility being assigned to the Commander as an additional duty. Four of the groups are associated with engineering and acquisition in the functional sense; in addition there is a comptroller, a contract group, an administrative group, and a plans and programs group. The PMOA contains most of the individual Program/Project offices (PMA), which function as matrix organizations. An examination of one of the four groups associated with engineering and acquisition shows the Acquisition Group (AIR-05) is further subdivided into nine functional and three staff divisions. In this study we shall examine one of these, the Avionics Division, in greater detail, in an endeavor to determine how a computer based mini-management information system could be placed within the division to support the Director and the first and second level managers directly below him.

B. The Avionics Division Organization and Mission. The Avionics Division is further subdivided into eight functional and two staff branches, as shown in Figure 2. The staff

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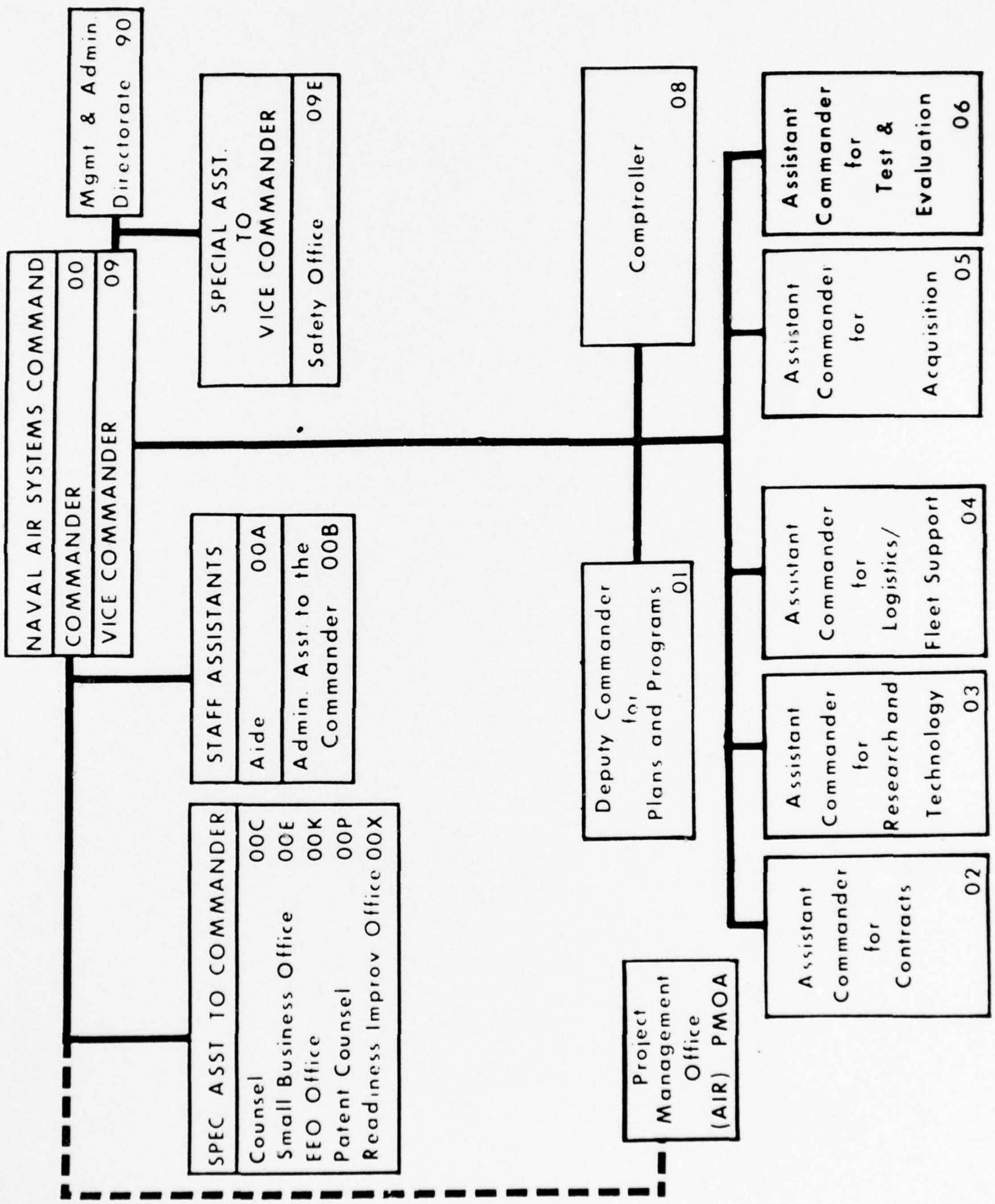

FIGURE 1

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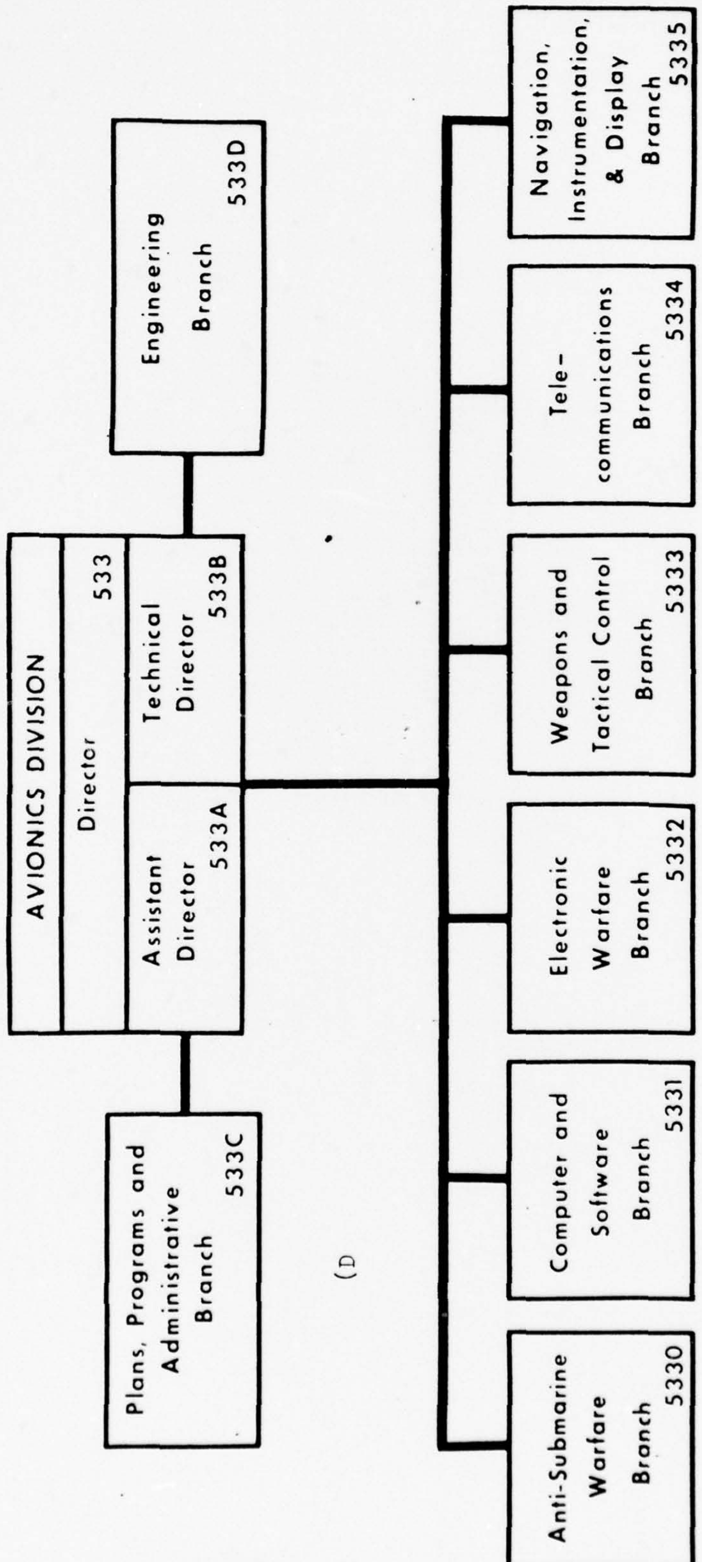

FIGURE 2

branches provide support to the Director and to the Division. The Avionics Division has the responsibility for concept formulation and material acquisition for every aspect of avionics and electrical power distribution for all aircraft, airlaunched missiles, cruise missiles and space avionics (3:533). The personnel within the Avionics Division not only support the line organization in the division, but they also provide support to the PMOA for the 22 designated projects contained within that group.

C. The Program Manager for Avionics. In addition to the above functions, there is embedded within the Avionics Division a Program Manager for Avionics, assigned to the Division Director as an additional responsibility. The PMfA was chartered 12 February 1977, and was charged to provide centralized direction and guidance over common avionics systems, subsystems, components, equipments in engineering development, production, modification and initial logistic support (4:1). The Program Manager is authorized to designate Deputy Program Managers for critical high priority avionics, requiring intensified management, which are supplied as government furnished equipment (GFE) to more than one weapon system, and to designate other individuals to function as Acquisition Managers for less critical avionics systems supplied as described above (4:2). With a potential for approximately five designated Deputy Program Managers, over a hundred Acquisition Managers responsible for several thousand

components, and the assigned responsibilities as the Avionics Division Director, a properly designed computer based mini MIS could be of assistance to the PMfA/Director in the management of the many and varied assets and duties for which the division is responsible. Additionally, the proposed MIS would also be invaluable in performing the myriad of repetitive administrative tasks currently being done in a manual fashion in support of the division.

D. Current Procedures Within the Avionics Division and the PMfA:

In discussing the current operating procedures within the Avionics Division, only those which would be effected and considered meaningful, if the proposed MIS were implemented, will be discussed in the succeding paragraphs. The ground rules stated in Section I will be considered when selecting subjects considered as meaningful. There are four general catagories of work currently being performed within the Avionics Division which could be incorporated into a computer system. They are: general administration, financial matters, training, and the PMfA functions. Each of these will be discussed in subsequent paragraphs.

1. General Administration. The Administrative staff which supports the Director is assigned the responsibility for most of the general administrative functions for the division, with some assistance from the individual branch clerical staffs.

a. Personnel Records/Rosters. There are approximately 200 civilian and military personnel in the division, which results in an extensive number of personnel related documents and rosters which require updating quite frequently. With the normal inter and intra-divisional movements, rosters are constantly being corrected and updated. Additionally, there are numerous periodic roster related reports required; unfortunately, no two are alike and each has a different structure not only in the order, but in type data required (6). In addition, there is a very active effort underway (Lee Billets) which is attempting to halt the long term erosion of personnel manning levels within the headquarters. This effort requires an extensive amount of work and documentation, since the entire effort is structured in a manner similiar to the Zero Based Budget (ZZB) concept, in that all unfilled billets must be scrubbed, and each billet still considered necessary must be rejustified from the ground up. This process has been lengthy and the numerous iterations which have occurred would rival the number of changes in a major project. With each change, the entire set of cover documents associated with the Lee Billets must be updated.

b. Ticklers. The Avionics Division currently receives 500-600 pieces of correspondence, and 100-150 messages per day(7), many of which require Division action. Currently there is no tracking or follow up system imposed on

the correspondence, and as a consequence, when there is an inquiry made as to the status of a piece of correspondence, there is no clearly defined documentation as to who has the correspondence, and who is responsible for action. If a subject can be discerned, the engineer assigned the piece of equipment/responsibility is queried as the to status of the correspondence. At times this fails to turn up the missing documents and many hours are expended just in an attempt to locate the missing item.

In any bureaucratic organization, there are always numerous periodic reports required, from daily to yearly on such diverse subjects as personnel, financial program status, "ilities", and time accounting. The present procedure used to initiate these reports ranges all the way from a well organized card file to the corporate memory. An additonal catagory of required reports exists which is not calander oriented, but is situationally dependent. The requirements for this type of report are also listed in formal tickler systems, and to a much greater degree in the corporate memory.

c. Classified Material. The Avionics Division currently is responsible for over 1,000 classified documents, and in the recent past, this number has exceeded the 2,000 mark(6). The accountability and tracking of these documents is a laborious and time consuming process. During the time a classified document is within the division, each will be

signed for, as an absolute minimum, six times, with two more transactions required for each additional person who reviews the document.

d. Visitor Control. Although Jefferson Plaza, where NAVAIRSYSCOMHQ is located, is a public building, a non DOD visitor is not allowed access to office space where classified information is being handled in the open, unless he holds a valid security clearance which has been filed with NAVAIRSYSCOMHQ. If no clearance is held, the meeting must take place in an area where a visitor will not be exposed to any classified information. Currently each branch receives copies of visit requests which states the visitor's clearance and the DOD official who is to be contacted. This information is maintained in the security office and at the branch level where the visitor's clearance is checked when he arrives for a visit.

2. Financial Matters. Although the Avionics Division has the responsibility for the material acquisition of equipment worth multi-millions of dollars, the Division does not normally directly control the PMA's program funds used to acquire the GFE avionics for a particular weapon system. However, there are a significant number of dollars which are under the direct control of the Director. These funds can be catagorized into two general groups, "directed" and "allocated". The directed funds are those which a

project/program manager will send to the division for a specific purpose. These funds then come under the control of the project engineer to disperse on the project for which they were ear marked. They are normally used to procure special equipment, or are passed to a field activity for funding of an Air Task. The second general catagory of funds which the division receives, the allocated funds, are normally associated with RDT&E projects, with a smaller amount of dollars received for Operations and Maintenance, Navy (O&MN) efforts. These allocated funds cover such diverse things as the AYK-14 (Multi purpose, general airborne computer), the ARC-182 (Combination Radio), and the Naval Avionics Facility, Indianapolis (NAFI) Military and Production Support funding. A third catagory for which the division is responsible is travel funds. Though no dollars are actually dispersed by the division, there is a budget established for administrative travel, and in many instances, there are additional funds made available by the PMA's for travel by division personnel in support of their projects. All of the funds associated with travel must be tracked to ensure the specific account is not overdrawn inadvertantly. At the present time all of the financial documents are maintained in ledgers, by hand, with no machine assistance other than a mechanical adding machine.

3. Training. In an effort to keep the personnel assigned to the headquarters knowledgeable on the latest in

technical, management, and administrative subjects, and to provide the necessary training for junior employees, there is a very active training program within NAVAIRSYSCOMHQ. Yearly, each employee submits a personal training plan, which is reviewed and approved by the appropriate people in the chain of command above him, and is then forwarded to the command training department. If a course, which an employee desires to take, is scheduled during the year, the employee submits a request for training. The request is compared with the Individual Yearly Training Plan (IYTP) and if the requested course is on the IYTP, approval is normally given. If required, funds are made available for the training course. However, there is no centralized effort made to schedule personnel into courses which they have listed on their IYTP.

III. A Computer Based Management Information System

A. Purpose. A computer based management information system should be capable of providing upper management with all of the necessary, relevant information, when it is desired, and in the format requested, to support management in the decision making process. All facets of cost, schedule, and technical performance should be available, such that the allocation of resources and the selection of alternatives, and trade-offs can be make in the most intelligent manner, based on all of the known facts of the situation (2:55). The system should have the capability to synthesize, collate, and analyze the data as necessary. In addition, it should be able to cross organizational lines to provide integrated and non-redundant information.

B. Description. With many types and sizes of computers available today, the number of combinations, considering the peripherals, which could be conceived is almost limitless. Even within a particular size catagory, such as micro, or mini, there exists numerous combinations. The purpose of this study is not to identify a specific make, model, or software package; that decision will be left to the ultimate user. To be effective and to adequately carry out the desired functions which will be described in more detail in section IV, the hardware descriptions will be couched in generic terms. To implement the proposed functions, it is recommended the heart of the system, the central processing

unit (CPU) be a 16 bit micro or mini computer, capable of interfacing with other, larger systems currently in existance within DOD. Control of the system should be via an interactive video terminal, connected to an alphanumeric keyboard. The system should be able to accomodate at least three terminals, in addition to the other peripherals. One of the terminals should have the capability to produce a hard copy of the information displayed on the screen. A hard copy, in smooth format, is also required at times, hence, a moderate speed printer should be included. With the amount of data to be stored and handled, a twin floppy disk drive unit will be necessary, and for long term storage, as the system grows, a hard disk memory unit, capable of storage in the megabyte range should be considered.

C. Advantages. Some of the more salient features which make a computer based MIS useful and valuable will be listed in section D below. However, before getting into a more detailed discussion, some of the general characteristics of a computer which make it so adaptable and useful in this type of application will be mentioned. The two which separate it from other types of computational and informational systems are its speed in manipulating data and its ability to store and retrieve large amounts of information in a very short time. These two are germane to all the advantages which a computer possesses. The ability to store and process large amounts of data make it especially useful in analyzing the

information and presenting it in a manner which is not intuitively obvious from casual observation. This alone reduces the amount of time required to scrub and manipulate the data by hand. If no algorithm is feasible, the computer can, with heuristic methods, analyze the information although this can be a time consuming process. Though a computer cannot think or make decisions, once programmed, it has the capability to complete repetitive tasks (often referred to as "heel and toe" type operations) in a rapid, and usually flawless manner. One final capability which makes a computer so advantageous to a MIS is the ability to change the mode of operations by reprograming. After the initial program is inserted and used, it can be modified in an iterative type process to improve the efficiency and the effectiveness of the operation.

D. Attributes of a Sucessful MIS. A review of the applicable literature on MIS reveals a list of attributes which a MIS should possess in order to be useful, and avoid the many pitfalls encountered by previous systems. A few of the more relevant ones have been selected, and are included below as being appropriate for the type of system being suggested. Some have been mentioned in the previous sections, however, they will be listed again to provide a central location for future reference.

1. A guiding principle, which must be observed if the system is to prove useful, around which the system must be

designed and programmed, is the KIS approach, (Keep it Simple). With the limitation of dedicated personnel to operate and maintain the system, and to handle walk-in type customers, any complexity not required will only detract from the overall effectiveness.

2. The MIS should be supportive of the managerial decision making process by supplying relevant information when required, and in the desired format (2:1). A MIS is not capable of decision making, but rather it extracts the pertinent information from the embedded files and presents it in a manner which can be useful in reaching a logical decision.

3. The resident program must have the capability to screen and manipulate the data such that information is displayed only when critical thresholds have be exceeded. The mass of data contained in the memory of a MIS is meaningless to the upper management if presented in its totality. The ability to consolidate and summarize, screen, and selectively present the needed information is one of the more valuable assets of a computer (9:22).

4. The MIS should support executive useage by crossing organizational lines, and be responsive to unstructured requests for information by providing integrated and non-redundant information (2:10). The many sources of information on a particular project which exist within an organization make it a time consuming process to collect and

summarize the data on a particular aspect of a problem or project. If done by one intimately familar with the project, ofttimes some of the basic and meaningful data is inadvertantly omitted, since the resident expert is so familiar with every aspect of the problem.

5. The data base format must be structured in the simplest form possible to allow for ease of insertion, updating, expansion, deletion, error detection, and retrieval of information. In a mini-MIS, without dedicated personnel managing the system, much of the data base will be built by the resident experts on a subject, or on an ad hoc basis by available personnel. In the proposed system, the data base will have to be time phased so as to not disrupt the normal assignments of personnel within the organization. Additionally, an error detection system must be incorporated, in so far as possible, to preclude mistakes from being inadvertently introduced into the data base (2:63).

6. The top management (Division Director) should have his own terminal (2:81). To be useful, a MIS must support the top management; if it is inconvient or time consuming to obtain the desired information, management will not support the system. As this perception permeates the lower levels of the organization, support for the MIS will be lost. In the particular case under discussion, success will be dependent on the efforts of almost all the personnel in the division.

7. Prior to actual installation, careful study and

design of the proposed system is absolutely necessary. During each phase of the study, feedback must be provided into the planning process, by the users, to ensure the system and design reflect the real world (10:58).

E. Security. When planning the installation of a computer, the security of the information which will be loaded into the data base must be given careful consideration. In NAVAIRSYSCOMHQ, two general types of security must be considered: one, classified information, and two, security of personnel data collected, bearing in mind the Freedom of Information Act. If classified information is to be stored in the computer, security can be maintianed either by restricting the use of the computer to persons properly cleared, or by coding the information such that it cannot be retrieved unless the proper code or key word is used. The second type of security problem, personnel data, is insidious and takes some forethought as the desired data elements are being considered for inclusion into the MIS. Singularly, they do not pose a problem; however, when many elements are included, and can be viewed or retrieved in the aggregate, this information can become sensitive. As a result of the Freedom of Information Act, the latter type can be requested and normally will have to be provided. Though not an overriding consideration, the security aspects of the problem must be considered when the planning is being conducted in conjunction with establishing the MIS.

IV. Functions for Consideration

A. General. The number of features which can be incorporated into a MIS are almost limitless, and the combination of data, techniques for storage, and useage are only limited by the imagination of the user. However, in this study, only those items currently being done or considered to have future potential will be discussed. No potential re-organization or re-functioning of the Division or PMfA will be taken into consideration, although introduction of computer technology might well result in changes to the functional flow, shifting of responsibilities, or altering the scope of jobs.

B. Avionics Division Considerations. As discussed in Section II, there are four general types of functions which could be adapted to a computer based system as an adjunct to the MIS being proposed. The four functions, administrative, funding, training and the PMfA will be discussed separately and in more detail below. The current procedures will not be reiterated again unless it will clarify a particular point in the ensuing discussion.

1. Administrative.

a. One of the more important functions which could be placed on the computer would be the personnel files. All of the data elements for each person required by all of the recurring reports could be incorporated. The data desired on one person or the specific elements for the entire

division could be produced in a timely manner, and in terms of hours required to complete each roster would represent a significant savings. From interviews conducted with the personnel responsible for preparing the various rosters (6), it is estimated that the time saved during a year could be measured in the people-month range vice hours or weeks. The other related personnel documents, if computerized, would also be a saver of time. As changes occur the appropriate data elements could be modified or inserted in the computer which would produce the required reports as necessary with all of the corrections made. As this system is implemented, care must be exercised that changes are entered as they occur, and not be allowed to accumulate until some time in the future when they will be entered. This degrades the data base, errodes confidence in the system, and if the manual filing system has been dropped, the checking and updating of the system becomes a nearly impossible task.

b. Tickler systems are another area where time and effort can be saved, and the responsiveness and effectiveness of the division can be improved. Incoming action correspondence, messages, and memos can be entered and a periodic print out provided to the responsible person, with copies to the cogiznant supervisor. When required action on a piece of correspondence has not been accomplished by the due date, composite readouts can be provided to the next level

supervisor, to ensure he/she is aware of the situation existing within his/her organization. This type of system tends to remind people of outstanding action items. It is an indication of the workload being carried by people within a particular work center, and of the capability and performance of the assigned people. Additionally, bottle necks can be identified, and those workers who are carrying too large of a workload will become apparent. The KIS principle must be used to ensure the assignment, and the feedback when action is completed, is simple, direct, and does not impose an administrative burden; otherwise the workers will tend to disregard the tickler system, and the output will be meaningless.

c. Ticklers for periodic and situational reports are ideally suited to be computerized, thereby ensuring the organization is given timely notification of an impending report. Compliance is no longer dependent on someone reviewing the card file, or tapping the corporate memory. There is also a likelihood that the required report is not held in the manual tickler system (card or memory), especially if the report is infrequently used or normally not germane to the functions of the organization. Once the information has been entered into the data base, however, it will always be available for display when required.

d. Control and accountability of classified documents is another area where the data storage capability of a computer can prove valuable. With the amount of book-keeping required, the time and effort saved would be well worth the investment. Since accuracy is vital in control and accountability of classified documents, a form of double entry bookkeeping would be required to reduce the errors to an absolute minimum. In the area of classified material, care must be exercised to ensure that the data base has adequate safeguards when classifed titles of publication have been entered into storage.

e. A central location for visitor control, and clearances would be a more efficient system than that currently practiced, and in most cases would provide better control. Additionally, it would reduce the workload now imposed on the branch clerical staffs, and would give better visibility into the number and types of visitors, both DOD and contractors, who visit the Avionics Division.

f. When documentation is originated to formalize an Engineering Change Proposal, (ECP), it becomes the originators responsibility to track the Configuration Control Board (CCB) mat through the 20 to 25 persons on the "chop" chain. Periodically, the CCB secretariate requests the status of certain proposals, if the status and the location were

tracked on the computer, an accurate and timely reply could be provided. Greater visibility of the entire CCB process would accrue, habitual road blocks would be identified, and a historical record would result which could be used to justify changes to the current processing system. Of even greater importance, especially to the originators, the number of mats which get lost in the bureaucratic chain would be significantly reduced. At the present time, a five to ten percent loss rate is not unusual, which requires the mat to be restarted through the entire process once again. Those not familiar with all of the steps required to get a mat to the board, charge that the change process takes too long, little realizing some of the agonizing steps required from receipt of the ECP until final approval. With a computer based tracking system it would be easy to document the entire process, and maintain better control of the entire process.

g. As a means of improving fleet operational readiness, the pieces of equipment which are causing the most problems are flagged monthly by the 3M reporting system. The Division Director and the cognizant engineer are required to report, in person, to a direct representative of the Commander on the action initiated or ongoing to correct the deficiencies which are causing the equipment to malfunction. This process of correcting deficiencies is long and tedious, consequently, many items will remain on the list for an

extended period of time. Monthly a formal status report must be updated, and adequate justification given to substantiate the ongoing actions. If it appears only lip service is being given to solve the problem, additional pressure is brought to bear through the chain of command, and priorities are reordered. Integrating the 3M data on selected systems, with the action underway or contemplated, would give good visibility to the cost, schedule, and expected improvement for the Division Director.

h. Within the Division, some equipment falls under a Foreign Military Sales (FMS) case. To ensure that proper accounting is made, a double book keeping system is required. Integrating this into the standard time accounting system through use of the MIS would provide better accountability of the FMS effort, and would reduce the work load on those responsible for the accounting and on the FMS personnel themselves.

i. Another area which creates problems, and requires many man hours to correct when conflict arises, is the scheduling of meetings, briefings, and conferences (5). Ofttimes, meetings of one type or another have to be cancelled after much advnace planning has occurred because of a confict in schedules of key persons within the Avionics Division. This is disruptive to the normal flow of business,

and almost invariably delays the project or program concerned. A central file of future meetings, briefings, and conferences would make long range planning more effective and preclude some of the confusion which now occurs.

2. Financial Matters. All of the financial matters which are now handled by the Division could easily be placed on the computer and as changes occur, they could be entered into the financial data base. With the proper instructions, all of the necessary documents would be updated with the latest information. With the ability to rapidly "crunch" numbers, all of the totals and remaining balances would be updated without the necessity of re-entering all of the data which has not changed. With this data in the memory, spending rates, obligations, and projected year end balances would be readily available to those responsible and to the Director. All of periodic reports could rapidly be produced, leaving the financial people free to better plan and control the the overall program, rather than spend their time on the book keeping process.

3. Training. As has been previously discussed, there exists a gap between the planning and execution of an approved IYTP. Frequently the long range course schedule is available, but it remains the responsibility of the individual to match his IYTP against the long range schedule, an act not normally accomplished for one reason or another. If the course schedule and the IYTP were integrated on a

computer, a more efficient overall training program would result, and better use would be made of the workers' time. Over time, as a historical file is built on the training acquired by each person, more effective use of the potential talents and previous training which a person has received can be made. Currently, to retrieve this type of data, each training record must be reviewed to determine if a pool of talent exists in a particular discipline. Other features could be incorporated, such as the value of a particular course, or if a prerequisite course would make the selected course more meaningful.

C. Program Manager for Avionics Functions. When viewed in the aggregate, the greatest benefit can be derived from a MIS when the pertinent information relative to the tasks and responsibilities set forth in the PMfA charter are integrated into a system which will provide the PMfA with better visibility into the cost, schedule, and technical performance for all of the systems which have a designated deputy program manager. In addition, consideration should be given to including selected items from those handled by the acquisition managers on the basis of cost, and/or expected technical risk.

When the PM is acting as executive agent he must ensure that:

1. The development, acquisition, and support satisfy

technical and fleet logistics requirements,

2. The many responsibilities in the definition, engineering developments, test and evaluation are properly defined,

3. The initial logistic support for acquisition and full scale production are all efficiently integrated.

When carrying out these responsibilities, the MIS can assimulate the many pieces of information which come from various sources to support these requirements for each piece of equipment.

With the inherent manpower limitation, the initial implementation will not be able to include data much below the first level of the Work Break Down Structure (WBS); however after the MIS has been in operation for some time, the data base will have expanded, which will provide greater detail on many more of the items for which the PMfA is responsible.

D. Engineering Tasks. Many of the personnel within the Avionics Division are classified as engineers, but with the significant decrease in the overall manning during the past ten years, engineering tasks have been displaced by the requirements for more engineering management to ensure that all facets of the acquisition process are considered in each program. This places a greater demand on the engineers' time, and does not allow the development of the technical

expertise previously held on a piece of equipment for which an engineer was responsible. The availability of a MIS would allow the engineers more flexibility in the management of their systems, since each can incorporate as much detail as is desired. In addition, the MIS/computer combination should have an engineering package as part of the software, which will allow the engineering community to delve deeper into technical problems which surface during the design, production, or employment of a system. Though the engineers are not expected to solve the problems at the grass roots level, the ability to examine the problem in greater detail would allow a better insight into the overall situation, and would allow the engineer to become more conversant with his assigned equipment.

E. General. In the miscellaneous catagory there are several other tasks which are currently not being done, being done on an infrequent basis, or are in the offing as a requirement, which have a potential if integrated into a MIS. As an example, a cross index of aircraft, by type, with the specific avionics equipment which is installed would be valuable. This type of information is constantly being requested, and though a publication is currently available which contains this information, it is only updated annually, and ensuing changes are not made until the volume is published the following year. A MIS type system could be updated as the changes occur, and current printouts of any

combination would be available on a real time basis.

There is no consolidated membership listing for boards, committees, or similiar type organizations. As personnel shift jobs, requirements for membership change, and new groups are formed, the requirement to have a representative still exists. Once established, a membership listing of personnel within the division would ensure commitments are met, and more importantly, the division interests in a situation would be presented.

At the present time there is a movement underway to try and implement some type of personnel workload accountability in an endeavor to quantify some of the diverse efforts in which the people within the organizatin participate. The use of a computer for this type of an effort is almost mandatory, but the data input requirements would be staggering, and would require several additional people to compile and enter the data.

With the advent of the ZZB, the requirements for dollar tracking and the ramifications which results from the numerous perturbations will create an additional work load in justifying each program with the required updates. If adequate information has been put into the computer data base, the numerous "what if?" questions on the three levels

of the ZZB can be much more easily answered and will not create as large an impact as would be expected from ZZB.

V. Implementation and Human Factors

A. General. During the detailed planning and installation phase, care must be exercised to ensure a solid plan has been developed, and that all of the key people who will be working with the system have been involved and properly trained in the purpose and use of the new system. If this is not accomplished, the potential of the system will never be fully realized, and the growing pains experienced will significantly increase the amount of time required to get the system on the line.

B. Implementation. As has been stated earlier, it is not expected that additional people will be made available who can be dedicated on a full time basis to the MIS, though many of the books on the subject strongly advocate this approach. As a means of overcoming this limitation, start integrating functions into the computer system at a slow rate, allowing the system to grow naturally. However, it must be planned and controlled if this evolutionary approach is expected to succeed. As functions are integrated into the system, it is expected this will free up some of the manpower which can be devoted to placing more functions into the MIS. Basic to the successful implementation is sound training, drawing on at least one person from each branch which will be using the system. The training course should be brief and interesting (8:130), and if possible, the person chosen should be one who is considered the best communicator from the particular

functional area. Once the training is completed, and the system has been placed in operation, a walk-in type of usage by divisional personnel will engender additional interest and useage of the MIS. Experience has shown this principle of "evolutionary implementation" works extremely well (7) in similiar situations where there has been a shortage of personnel to fully man the MIS/computer. By allowing wide useage of the system, the users become proponents of the system which spreads enthusiam and interest to others, leading to more use throughout the organization. "People who are designing systems should not want to solve all the problems, the object is not to acheive a utopia, it is just to make thing better that they were yesterday." (8:124) most aptly describes the evolutionary approach.

C. Human Factors. One final factor in the equation for successful implementation which must be given adequate preplanning, is the impact on the personnel whose jobs and responsibilities will be effected when the computer is introduced. If these people have not been included in the planning process early, and have not participated in the basic training, their perception of the situation will adverserly impact the MIS program. The fear of having their job abolished, or down graded, by some unknown mystical machine could lead to disaster for the entire operation, even faster than if top management does not support the system. They must be made part of the intial planning.

VI. Conclusion. No attempt will be made to recapitulate all of the advantages and disadvanteges of a management information system wich have been brought forth in this report. One universal truth must be born in mind when the conscious decision is made to install a computer in an organization to serve as a basis for a MIS; a MIS will require additional assets to install and maintain over that currently being expended to accomplish those tasks which the computer will absorb. However, the additional capability which a computer can provide to better manage all the projects will be well worth the effort expended. The payoff will be in the intangibles of better management and more efficient usage of assets in other areas for which the Division and the Program Manager are responsible.

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